

August 14, 2000

U.S. Department of Transportation
United States Coast Guard
Captain Gary Greene
13th Coast Guard District
Jackson Federal Building
915 2nd Avenue, Room 3506
Seattle, WA 98174

RE: USCG-1999-4974

Dear Captain Greene:

As discussed in our April 24, 2000 letter to the Docket USCG-1999-4974, the Olympic Coast National Marine Sanctuary (OCNMS or Sanctuary) has been analyzing the population of vessels transiting the OCNMS Area to be Avoided (ATBA) for the risk they pose to Sanctuary Resources. The enclosed analysis, completed by George Galasso, was conducted to evaluate the implications of extending the applicability of the ATBA to additional classes of vessels.

The Sanctuary Advisory Council and the North Puget Sound Risk Management Panel have discussed the extension of the provisions of the ATBA to vessels not currently included. Both of these Federal advisory bodies conditionally supported the extension of ATBA applicability. This issue was also the subject of public comment in 1995 (CGD 95-006). While the concept of extending ATBA applicability to large commercial vessels (LCV) has received broad support, concerns on the impacts to smaller vessels, especially fishing vessels, and the economic impact to the Port of Grays Harbor have been expressed.

The enclosed analysis evaluates all vessels, identified by the Sanctuary's vessel monitoring program, which transited the ATBA in 1999. This population of vessels has been evaluated by length overall (LOA), gross registered tonnage (GRT) and bunker capacity measured in metric tons (MT). The Coast Guard's Regulatory Assessment,

No. 9522-002, was also used to evaluate the risk associated with these vessels, as well as evaluating future trends in risk for the area.

In developing our recommendation, the following criteria were used:

- Reduce the potential for a significant oil spill within OCNMS, considering both current and future sources of risk based on marine traffic patterns;
- Ensure human safety is upheld;
- Potential for IMO approval, based on history of other approved ATBA's; and
- Ability to implement recommendation, including monitoring

As a result of this analysis I recommend that the preliminary study recommendations of the Port Access Routes Study be amended to extend the applicability of the OCNMS ATBA to all vessels equal to or greater than 1600 GT that are transiting through the area, in addition to the current restriction regarding transport of oil or hazardous materials.

The Sanctuary appreciates the 13th Coast Guard District's efforts related to PARS and in co-chairing the North Puget Sound Risk Management Panel. We look forward to working with you in implementing those recommendations, which will substantively improve the region's environmental and maritime safety. I will be in touch in the near future to discuss how we may be of further assistance in moving this recommendation forward.

Sincerely,

Carol Bernthal, Superintendent
Olympic Coast
National Marine Sanctuary

Enclosure

cc: Congressman Norm Dicks
Sanctuary Advisory Council
Dan Basta, Chief MSD
Lindy Johnson, Attorney Advisor, NOAA

INTRODUCTION

In an April 24, 2000 letter from the Olympic Coast National Marine Sanctuary (OCNMS or Sanctuary) to the Coast Guard (Docket USCG-1999-4974), the Sanctuary commented on the preliminary study recommendations of the Port Access Routes Study (PARS). In addition to supporting the PARS recommendations concerning changes to the Traffic Separation Scheme (TSS) and the Area to be Avoided (ATBA) boundary (figure 1), the Sanctuary raised the issue of ATBA applicability. This analysis was conducted to provide the Coast Guard with additional information regarding this issue. The population of vessels transiting the OCNMS ATBA has been studied for the risk they pose to Sanctuary resources. This analysis evaluates various scenarios of extending the applicability of the ATBA to additional classes of vessels.

The Sanctuary Advisory Council and the North Puget Sound Risk Management Panel have discussed the extension of the provisions of the ATBA to vessels not currently included. Both of these Federal advisory bodies conditionally supported the extension of ATBA applicability. This issue was also the subject of public comment in 1995 (CGD 95-006). While the concept of extending ATBA applicability to large commercial vessels (LCV) has received broad support, concerns on the impacts to smaller vessels, especially fishing vessels, and the economic impact to the Port of Grays Harbor have been expressed.

The analysis evaluates all vessels, identified by the Sanctuary's vessel monitoring program, which transited the ATBA in 1999. This population of vessels has been evaluated by length overall (LOA), gross registered tonnage (GRT) and bunker capacity measured in metric tons (MT). The Coast Guard's Regulatory Assessment, No. 9522-002, was also used to evaluate the risk associated with these vessels, as well as evaluating future trends in risk for the area.

The Sanctuary has identified the entire population of vessels, which participated in the Cooperative Vessel Traffic Service (CVTS) and transited through the ATBA in 1999 (figure 2). The mean bunker capacity of all such vessels was 3,775 metric tons (MT). The mean length overall (LOA) was 147 meters. Mean dead weight tonnage

(DWT) and gross registered tonnage (GRT) were 30,806 and 18,959 respectively.

To further aid in the analysis, the Washington State Department of Ecology identified all LCV's, that transited between Grays Harbor and the Strait of Juan de Fuca in 1999.

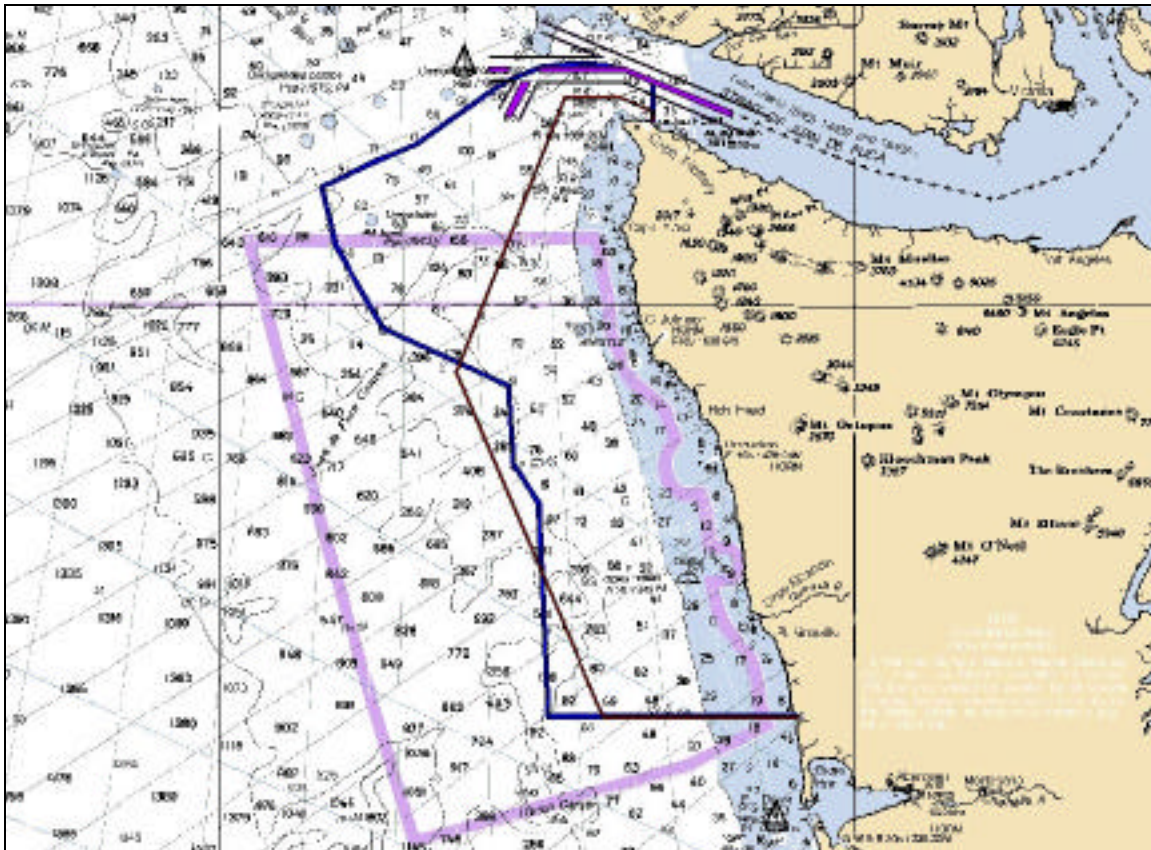


Figure 1: Chart of PARS recommended changes to TSS and ATBA

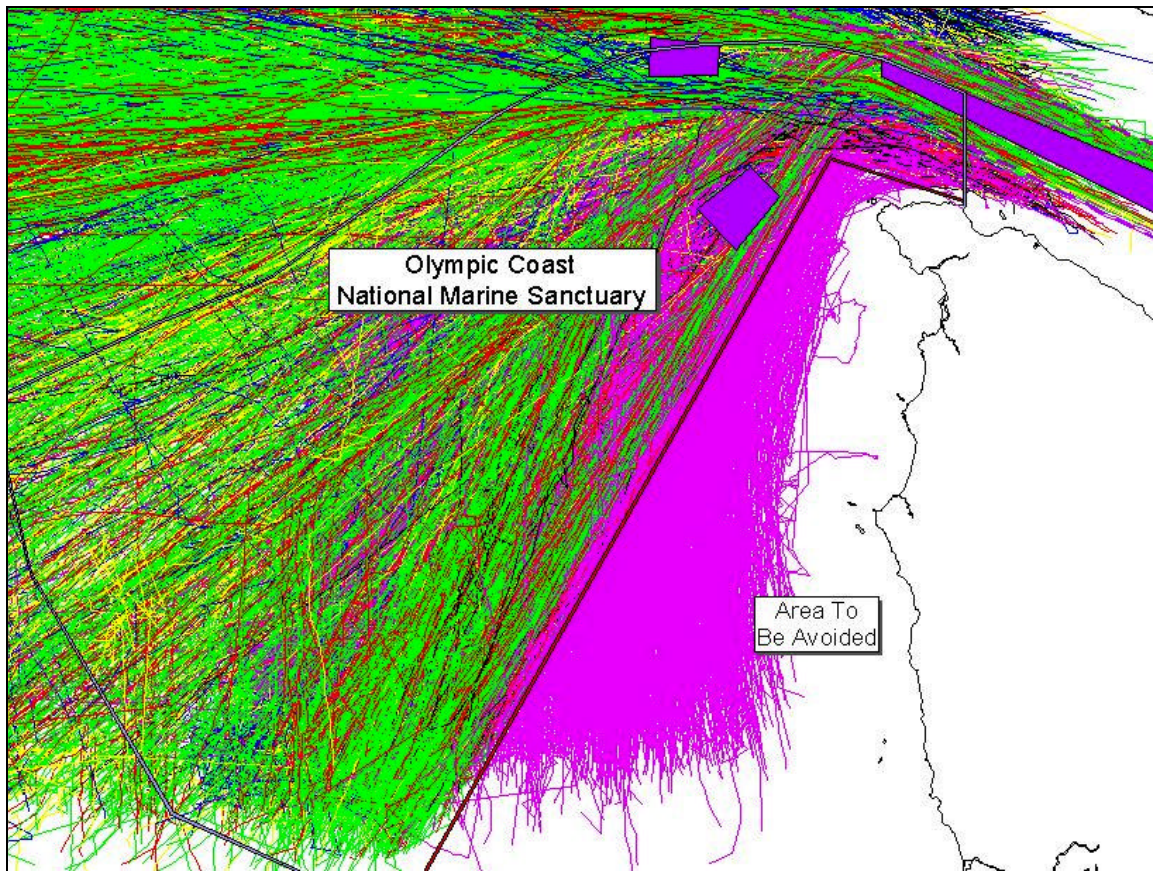


Figure 2: 1999 Vessel transits; 1,854 (in magenta) out of 13,617 transits were in the ATBA.

METHODOLOGY/DATA SOURCES

The major data source of this analysis is radar data from the Canadian Coast Guard's Tofino Marine Communications and Traffic System (MCTS). The Sanctuary uses this data in their ATBA Education and Monitoring Program¹. The Sanctuary processes the MCTS data² and imports it into a Geographic Information System (GIS) along with certain attribute information, e.g.:

VESSELNAME	Vessel Name provided by the Tofino Operator
VESSELTYPE	Vessel Type expanded from TOFINOCODE
CLASSNAME	General Class Name designated by OCNMS
DATE	YY-MM-DD provided by the raw Tofino data
TIME	HHMMSS provided by the raw Tofino data
LATITUDE	Latitude converted to decimal degrees

¹ The methodology of the OCNMS Vessel Monitoring Program is discussed in length in "Olympic Coast National Marine Sanctuary Area to be Avoided Education and Monitoring Program" (Galasso, 2000).

² MCTS refers to this data as LIRCS, which stands for Leigh Instruments Radar and Computer System.

LONGITUDE	Longitude converted to decimal degrees
TRACKID	Tracker ID number, in the range A00 - D99
MAJORCLASS	Class of vessel determined by TOFINOCODE
TOFINOCOD	Vessel type provided by Tofino System
IN_OUTBND	I (inbound) or O (outbound) based on vessel track
COURSEGOOD	Course Made Good using first and last points of track

The Sanctuary selected all vessels, which transited through the ATBA and exported the data to a database file. This database file was then populated with additional fields from two additional databases. The first was a second MCTS database called "CARDEX", the data fields added were:

CALLSIGN	Vessel's Call Sign
NAME	Same as VESSELNAME
LRNO	Lloyds Registration Number
LIRCS_TYP	Same as TOFINOCOD
LOA	Length Overall
DWT	Dead Weight Tonnage
GRT	Gross Weight Tonnage
SPD	Vessel's Speed
DRAFT	Vessel's Draft

The second database was the Washington Department of Ecology's Vessel database, the data fields added were:

VSL_LLOYDS	Lloyds Registration Number
VSL_NAME	Vessel's Name
FLAG_DESC	Flag State
CALL_SIGN	Call Sign
LENGTH	Length Overall
BEAM	Vessel's Beam
DRAFT	Vessel's Draft
GROSS_TONS	Gross Weight Tonnage
DW_TONS	Dead Weight Tonnage
BUNKER_CAP	Bunker Capacity in metric tons
MAIN_ENGIN	Engine Horsepower
SPEED	Vessel's Speed

Duplicate fields were evaluated as a data quality check and in some cases merged, to derive a more complete data set. Table 1 shows an excerpt of the resulting data set.

Summary data was then generated and statistical analysis was performed to further characterize this population of vessels.

CLASSNAME	VESSELNAME	VESSELTYPE	DATE	IN_OU TBND	FLAG	CALLSIGN	LRNO	LOA	DWT	GRT	SPD	DRA FT	BEAM	BUNKER _CAP	MAIN_ENGIN
Fishing Vess		Commercial F/V	99-12-01	O											
Freighters	AN BAO JIANG	General Cargo	99-12-01	O	CHINA	BOAX	8306943	145.5	16731	10551	15	9			
Freighters	ELEKTRA	RO-RO	99-12-01	I	SWEDEN	SIWB	9176577	199.15	22588	57018		11			
Freighters	EVER LYRIC	Container	99-12-01	I	TAIWAN	BKHI	7900807	202.6	28900	24804	21	11	30		22260
Freighters	HYUNDAI 201	Vehicle Carrier	99-12-02	O	PANAMA	3FHV8	8709119	174	9694	31367	19	8	28		12060
Freighters	KITE ARROW	Bulk Carrier	99-12-02	O	BAHAMAS	C6ON2	9077082	199.7	47000	36008	0	13	32		
Freighters	MANULANI	Container	99-12-02	O	UNITED STATES	KNIJ	7002071	219.6	27107	23785	23	10	29	7013	32000
Tank Vessel	JOHN BRIX	Tug Oil/Gas Barge	99-12-03	I	UNITED STATES	WCY7560		45.75	0	197	0				
Freighters	KAPITAN BETKHER	Bulk Carrier	99-12-03	I	CYPRUS	P3JH6	8314457	179.9	36663	23981	15	11	31	2598	8600
Government/M	MARIPOSA	Government	99-12-03	O	UNITED STATES	WLB397	WLB397	54.89	0	0	0				
Tugs/Barges	SS SOVEREIGN	Tug Misc Barge	99-12-03	I	CANADA	VDZP		37.51	0	432	0				
Government/M	ALERT	Government	99-12-04	O	UNITED STATES	WMEC 63		64.04	0	0	18				
Freighters	CSL CABO	Bulk Carrier	99-12-04	I	LIBERIA	D5XH	7117278	181.7	31364	19623	16	11	26	1602	13300
Tugs/Barges	GENE DUNLAP	Tug Chip Barge	99-12-04	O	UNITED STATES	WAS2433		35.6	0	0	0				
Freighters	JUBILANT	Bulk Carrier	99-12-04	O	LIBERIA	ELKA7	8414348	215	61342	43805	15	14	33	2620	11520
Tugs/Barges	MAIA H	Tug Log Barge	99-12-04	O	UNITED STATES	WYX2079	8842351	25.35	0	141	0				
Freighters	SINCERE PROMINEN	Bulk Carrier	99-12-04	O	PANAMA	3EPF3	8412936	155.9	23532	0	14	10	25		6250
Freighters	TZAREVETZ	Bulk Carrier	99-12-04	I	MALTA	9HYM5	9145229	168.6	21250	13967	14	8			
Freighters	HANJIN FELIXSTOW	Container	99-12-05	O	GREECE	SWWJ	8814512	242.9	44044	37193	22	12	32		28350

Table 1: Excerpt from 1999 OCNMS ATBA Analysis Data Set

CHARACTERIZATION OF ATBA VESSELS

MCTS uses 33 distinct classifications to identify vessels using their Vessel Traffic Services. Twenty-seven of these were accounted for in the ATBA in 1999. For the purposes of monitoring the ATBA, OCNMS has five classes of vessels. The OCNMS "Tank Vessel" class includes those vessels for which the ATBA applies. For the purpose of the ATBA Applicability Analysis a third grouping of vessels was created. Table 2 shows each of these three classifications, their relationship to each other, and the total count of vessels.

MCTS Vessel Types	OCNMS Class	Analysis Class	COUNT
Bulk Carrier	Freighter	Bulk Carrier	388
Chemical Tanker	Tank Vessel	Tanker	11
Coastal	Freighter	General Cargo	2
Coastal Tanker	Tank Vessel	Tanker	1
Commercial F/V	Fishing	Fishing	65
Container	Freighter	Container	334
Factory F/V	Fishing	Fishing	54
General Cargo	Freighter	General Cargo	126
Government	Govt/Misc	Govt/Warship	63
Hydro/Hover Etc	Govt/Misc	Misc	2
Ocean Going Tanker	Tank Vessel	Tanker	8
Others	Govt/Misc	Misc	69
Passenger	Freighters	Passenger	59
Private Yacht	Govt/Misc	Misc	46
RO-RO	Freighter	Vehicle Carrier	15
Reefer	Freighter	Fishing	4
Scientific/Research	Govt/Misc	Scientific/Research	25
Tug Chemical Barge	Tank Vessel	Hazmat Barge	13
Tug Chip Barge	Tug/Barge	Tug/Barge	91
Tug Light	Tug/Barge	Tug/Barge	48
Tug Log Barge	Tug/Barge	Tug/Barge	123
Tug Misc Barge	Tug/Barge	Tug/Barge	159
Tug Oil/Gas Barge	Tank Vessel	Hazmat Barge	46
Tug Target Tow	Tug/Barge	Tug/Barge	2
Veg Oil/Molasses Tanker	Tank Vessel	Tanker	1
Vehicle Carrier	Freighter	Vehicle Carrier	52
Warship	Govt/Misc	Govt/Warship	47
Total			1854

Table 2: Vessel Classifications

Table 3 and Figure 3 show the distribution of the 1,854 vessels found within the ATBA according to these analysis classifications. The most prevalent class of vessels found in the ATBA is the "Tug/Barge" class. These

vessels are slower moving and often transit closer too shore. As expected, due to the current provisions of the ATBA the Tanker and Hazmat Barge classes are not as frequent.

Analysis Class	COUNT	Percent
Tug/Barge	423	22.8%
Bulk Carrier	388	20.9%
Container	334	18.0%
General Cargo	128	6.9%
Fishing	123	6.6%
Misc	117	6.3%
Govt/Warship	110	5.9%
Vehicle Carrier	67	3.6%
Hazmat Barge	59	3.2%
Passenger	59	3.2%
Scientific/Research	25	1.3%
Tanker	21	1.1%
Total	1854	100.0%

Table 3: 1999 ATBA Vessel Distribution (by Analysis Class)

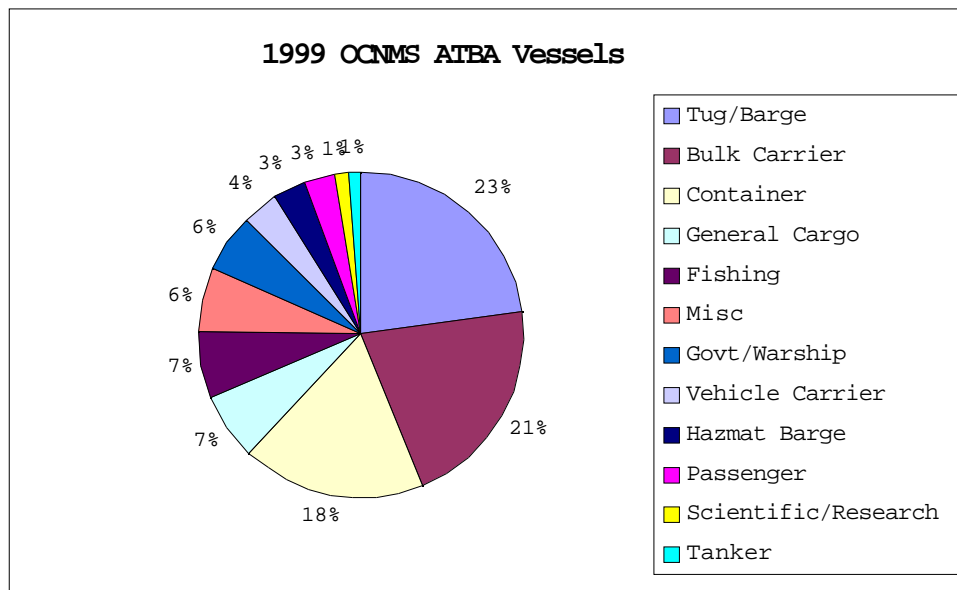


Figure 3: 1999 ATBA Vessel Distribution (All Vessels)

The vessels for which the ATBA does not apply, which have been identified as being of the greatest concern, are large commercial vessels (LCV). In 1999 these vessels represented approximately 50% of the vessels transiting

through the ATBA (938 vessels). Of these vessels, bulk carriers are the most prevalent at 41%, followed by Container Ships at 36%, General Cargo at 14%, and Vehicle Carrier/RO-RO at 7% (see figure 4). Most of these vessels

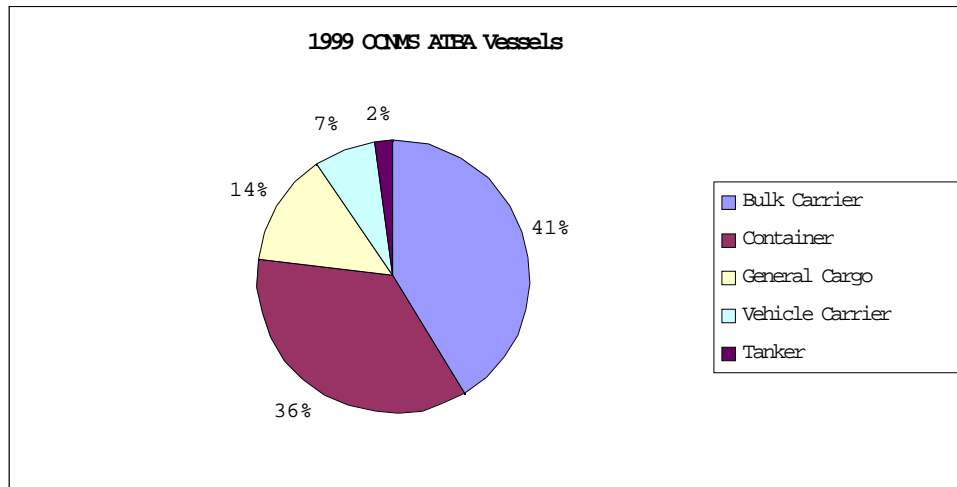


Figure 4: 1999 ATBA LCV Distribution

carry large quantities of persistent oil as bunker fuel.

In addition to looking at vessels that transited the ATBA by vessel class, OCNMS also evaluated four other variables. These four variables previously described in the "Methodology/Data Sources" section, are Length Overall (LOA), Dead Weight Tonnage (DWT), Gross Registered Tonnage (GRT) and Bunker Capacity (BC). Table 4 shows the basic statistics on each of these four variables for all vessels. Appendix A has the same statistics according to each of the twelve analysis classes.

Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	1391	463	16	340	147	2
DWT	997	857	132	171931	30806	668
GRT	1222	632	85	96400	18959	438
BC	531	1323	185	46900	3775	179

Table 4: Means Summary Table of all variables for all vessels

GRAYS HARBOR ANALYSIS

As previously mentioned concerns have been raised on the potential economic impact that a change to the ATBA may have upon the Port of Grays Harbor. To address this concern OCNMS requested that the Washington Department of Ecology (WDE) query their database to determine the level of activity of vessels transiting between Grays Harbor and the Strait of Juan de Fuca. For 1999 WDE identified 7 transits from Grays Harbor to the Strait of Juan de Fuca and 11 transits from the Straits to Grays Harbor (see table 5).

VESSEL NAME	VESSEL TYPE	GRT	SPEED	DATE DOCKED
GRAY'S HARBOR TO PUGET SOUND				
CENTURY STAR	BULK CARRIER	16725	13.75	4-Apr-99
BLUE NOVA	BULK CARRIER	14431	14.0	16-Jun-99
BLUE NOVA	BULK CARRIER	14431	14.0	28-Apr-99
BLUE NOVA	BULK CARRIER	14431	14.0	20-Sep-99
BLUE NOVA	BULK CARRIER	14431	14.0	5-Aug-99
ARCTIC STORM	FISHING VESSEL	4068	12.5	4-Jun-99
RUBIN STAR	BULK CARRIER	26444	14.2	26-Feb-99
PUGET SOUND TO GRAY'S HARBOR				
GRETKE OLDENDORFF	BULK CARRIER	13712	15.0	15-May-99
ARIES HARMONY	BULK CARRIER	17377	14.3	27-May-99
ARIES HARMONY	BULK CARRIER	17377	14.3	14-Jan-99
SEVEN OCEAN	BULK CARRIER	15884	14.5	10-Oct-99
TANAGRA	BULK CARRIER	13706	13.5	11-Jun-99
TOSCANA	BULK CARRIER	23253	15.75	22-Jan-99
STAR HARMONIA	GENERAL CARGO SHIP	32749	16.0	3-Nov-99
GLORY ISLAND	BULK CARRIER	14397	14.0	6-Jan-99
KEN SHIN	BULK CARRIER	19420	15.0	18-Jun-99
BRIGHT PHOENIX	BULK CARRIER	17075	14.2	28-Aug-99
BLUE GEMINI	BULK CARRIER	14431	14.0	3-Dec-99

Table 5: Vessels transiting between the Strait of Juan de Fuca and Grays Harbor, in 1999.

Assuming the Port Access Routes Study's Traffic Separation Scheme (TSS) recommendations are implemented, these vessels would have a 98 nautical mile transit from the Grays Harbor sea buoy "GH" to the new southern entrance of the TSS. If these vessels were to stay outside the ATBA they would have a transit of 108 nautical miles, equating

to an additional 10 miles in transit distance. Assuming an average speed of 14.3 knots, the additional ten miles would increase transit time by 42 minutes. This is not considered to be an unreasonable burden given other adjustments typically required by the shipping industry related to variable weather conditions or other factors.

DISCUSSION OF RISK

The 1997 Scoping Risk Assessment (Volpe Report) defines risk as the product of hazard likelihood and consequence. The Volpe Report rated accident likelihood by waterway segment. Volpe segment 2, "South J buoy approach", is within the northern portion of the Sanctuary. The three highest causes of accidents in this segment are, in order, collision, drift groundings and powered groundings. The primary risk that the ATBA addresses is drift groundings. By having LCV transit further off the coast, more time is available for the vessel to self-repair or call for a towing vessel, if they loss power or steerage. By moving vessels away from navigational hazards, risk from powered groundings is also reduced.

The Coast Guard Regulatory Assessment³ (RA) addresses the consequences of a spill through a qualitative environmental impact assessment. These assessments were generated utilizing simulated spills by different size and class vessels. One such assessment utilized a scenario concerning a hypothetical vessel with characteristics similar to the mean of those vessels transiting the ATBA (see table 4).

Scenario 3 of the RA considered a spill of bunker fuel of 10% of a vessel's capacity of 3,000 metric tons (81,300 gallons), which the report states, was based on the bunker capacity for "typical merchant vessels." The mean bunker capacity of vessels transiting the ATBA is 3,775 metric tons. The scenario considered that Bunker No. 6 oil was the fuel used by the "typical merchant vessel." As the report notes, "Since [Bunker No. 6 oil] is less volatile than crude oil, it can spread and be carried longer distances by winds and currents."

³Use of Tugs to Protect Against Oil Spills in the Puget Sound Area, Report No. 9522-002

After performing a computer simulation based on all the above as well as several other relevant factors (wind speed and direction, current and tide information, etc.) the model generated the following results:

"A simulated bunker oil spill of 81,300 gallons produced an oil slick that covered an area of 1,630 km² (629 sq. miles) including 37 kilometers (23 miles) of sandy beach. Beaches and fishery grounds were closed following the spill for three days.

Seabirds and marine mammals, which are especially vulnerable to floating oil, suffered damage. Between 5,000 to 6,000 waterfowl and seabirds were injured or killed. Fishery impacts were minimal because the oil concentration remained below the lethal threshold. Areas designated by the State or federal governments as wilderness areas, such as the OCNMS and Olympic National Park, also suffered impacts, because the public's perception of them as pristine was damaged by the spill."

Considering that the size of 1999 spill by the M/V New Carissa (a bulk carrier) which spilled approximately 70,000 gallons of bunker oil off the Oregon coast, the size of the simulated spill was a realistic estimate. The intent of extending the applicability of the ATBA, along with other proposed safety measures, is to reduce the potential for such damaging incidents to occur.

VESSEL TRAFFIC TRENDS

The Regulatory Assessment (RA) also provides a great deal of information regarding vessel traffic trends, vessel accident projections, and oil spillage rates. Starting with a forecast of the movements of crude oil and petroleum products, the RA notes that crude oil amounts transported to or from the Puget Sound refineries is expected to remain constant over the next 25 years. Movement of petroleum products was expected to increase by 5.9% per year. The forecast movement of dry cargo was projected to grow at a rate of 3.6% per year.

An increase in vessel size was also anticipated, both for crude oil carriers and for containerships. However, the RA notes that the design of crude oil carriers, product

tankers, and tank barges will be changing over the next 15 years. Specifically, the retirement of the single hull fleet under OPA 90 was considered, all such vessels were assumed to have double hulls by 2015.

The report projects the number of transits per year, in five-year increments, beginning in 2000 and continuing through 2025. Table 6 reconfigures RA table 10 to create the categories of *tank vessels* (laden barges and tankers) and *dry cargo vessels* (bulk carriers and containerships). This highlights trends in two categories that are relevant to our discussion of the ATBA; i.e., the ATBA currently applies to tank vessels and the extension of the ATBA to dry cargo vessels (large commercial vessels) has been recommended.

Vessel Type	Projected Transits per Year					
	2000	2005	2010	2015	2020	2025
Tank Vessels	758	780	805	833	868	905
Dry Cargo Vessels	7,513	8,167	8,827	9,878	11,071	12,425

Table 6: Strait of Juan de Fuca transits projection (adapted from RA table 10)

Transits for *tank vessels* the year 2000 amount to 758, while those for *dry cargo vessels* total almost 10 times as many at 7,513. More importantly for the current discussion of ATBA applicability is the projected increase in transits. In 2025 *tank vessels* are expected to be 905, or an additional 19.4%, while those for *dry cargo vessels* are projected to grow to 12,425, an increase of 65.4%.

Utilizing these figures for increased traffic, and the expected increase in ship size, the RA calculates the increase oil movements through the Straits by different classes of vessels from now until the end of the study period. When projecting oil movement for these ships, bunkers were assumed to be at 40% of capacity for all inbound vessels (nearing the end of their journey) and 70% of capacity for all outbound vessels.

While the amount of oil moved by tank vessels is greater than that transported in the bunkers of dry cargo vessels, projected increases differ. For 2000 the figures are 269 million barrels and almost 68 million barrels, respectively. For 2025 Tank Vessel movements are projected to grow to 299 million barrels, or an 11% increase. Dry

cargo ship bunkers increase to 129 million barrels, for a projected growth of 90%.

Changes in the proportions of oil moved through the Strait by different categories of vessels occur contemporaneously with the requirement that tankers and barges become double hulled by 2015. The RA takes this and several other factors into account when making predictions on future oil spill rates. These parameters were used to predict the average oil outflow projected for the study period. This information is presented in both tabular and graphic form in the RA. RA table 32, "Baseline-Projected Spill Volumes and Number of Accidents per Year", lists the predicted number of accidents and oil spills by vessel type. This is represented graphically in below in figure 2.

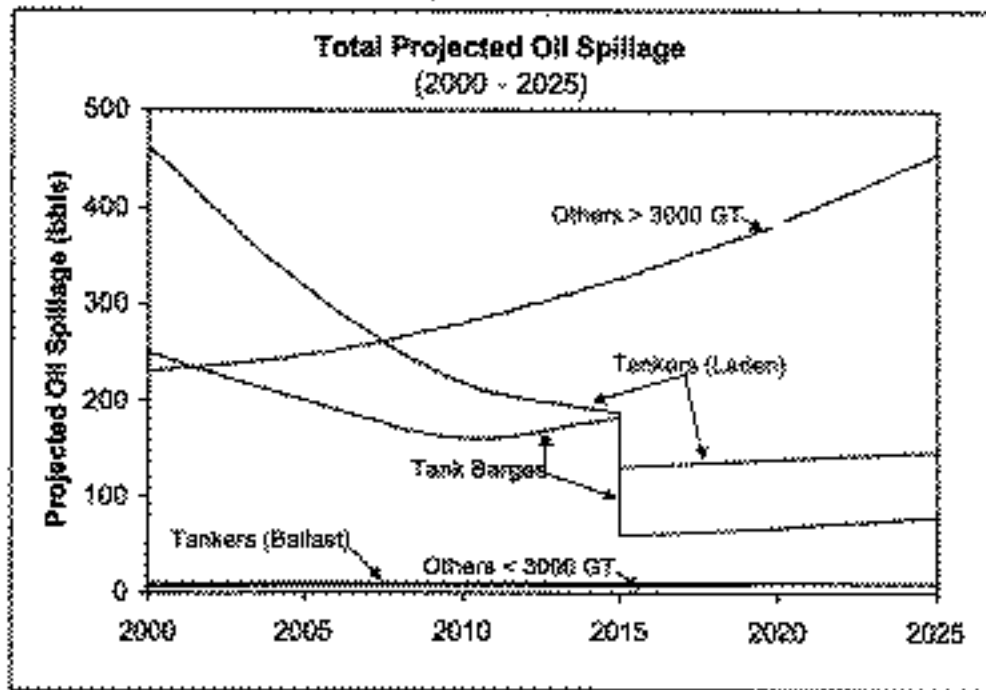


Figure 5: Baseline Oil Spillage by Ship Type (RA figure 6)

Figure 5 demonstrates a significant shift in the total projected oil outflow by vessel type from collision or grounding accidents over the next 25 years. By the Year 2025, 66% of the total projected outflow is attributable to non-oil transporting vessels. This is in contrast to the current situation, where non-oil transporting vessels are projected to be responsible for 25% of the project outflow.

SCENARIOS

Various scenarios for extending the applicability of the ATBA were considered based upon the analysis of vessels currently transiting the ATBA (Characterization of ATBA Vessels). For the analysis we considered making recommendations based upon: Gross Registered Tonnage (GRT); Length overall (LOA); and bunker capacity (BC). As we are primarily concerned with the potential impact of a large oil spill, the amount of oil carried as cargo or bunker fuel is of the greatest concern. In the case of oil (as well as hazardous materials) transported as cargo, the current ATBA applies. So the primary remaining concern is large volumes of oil carried as bunker. The Sanctuary did consider making a recommendation based on a vessel's bunker capacity; however, it was decided to make the recommendation based on GRT instead. This decision was based upon the following: (1) most IMO ATBA's currently use GRT; (2) a vessel's GRT is better documented and easier to obtain, thus aiding the implementation of the ATBA; and (3) OCNMS feels that GRT can be used as a proxy for bunker capacity.

The database was queried and statistics generated in a number of different formats. Some of the more useful summary tables are included in this report. Frequency tables and histograms were generated for each of the 12 analysis classes. An example (Figure 6), for all vessels, is illustrated below. Appendix B has a frequency table for all vessels. This information was used to evaluate different cutoff point for ATBA applicability. Table 4 (all vessels) and Appendix A (by class) show the number of observations and the number of missed values, minimum, maximum, mean and standard error of each of these four variables. This data for GRT, by vessel class, is summarized below in Table 7. This table gives a good indication of the average sizes of the different classes of vessels, which transit the OCNMS ATBA.

Vessel Class	Count	Missing Values	Minimum	Maximum	Mean	Std Error
Bulk Carrier	355	33	1300	79184	24554	531
Containership	308	26	9530	69246	25875	731
Fishing Vessels	67	56	100	19385	3253	408
General Cargo	109	19	165	34364	18445	739
Govt/Warship	14	96	1080	96400	10880	6718
Hazmat/Barge	30	29	197	26113	1067	864

Misc	30	87	96	17429	4450	1067
Passenger	50	9	89	77441	30893	3780
Scientific/Research	13	12	85	3180	2012	389
Tankers	20	1	4995	38672	22520	2983
Tugs/Barges	166	257	94	4721	446	59
Vehicle Carriers	60	7	1382	57018	30670	1610

Table 7: Mean Summary Table of Gross Registered Tonnage

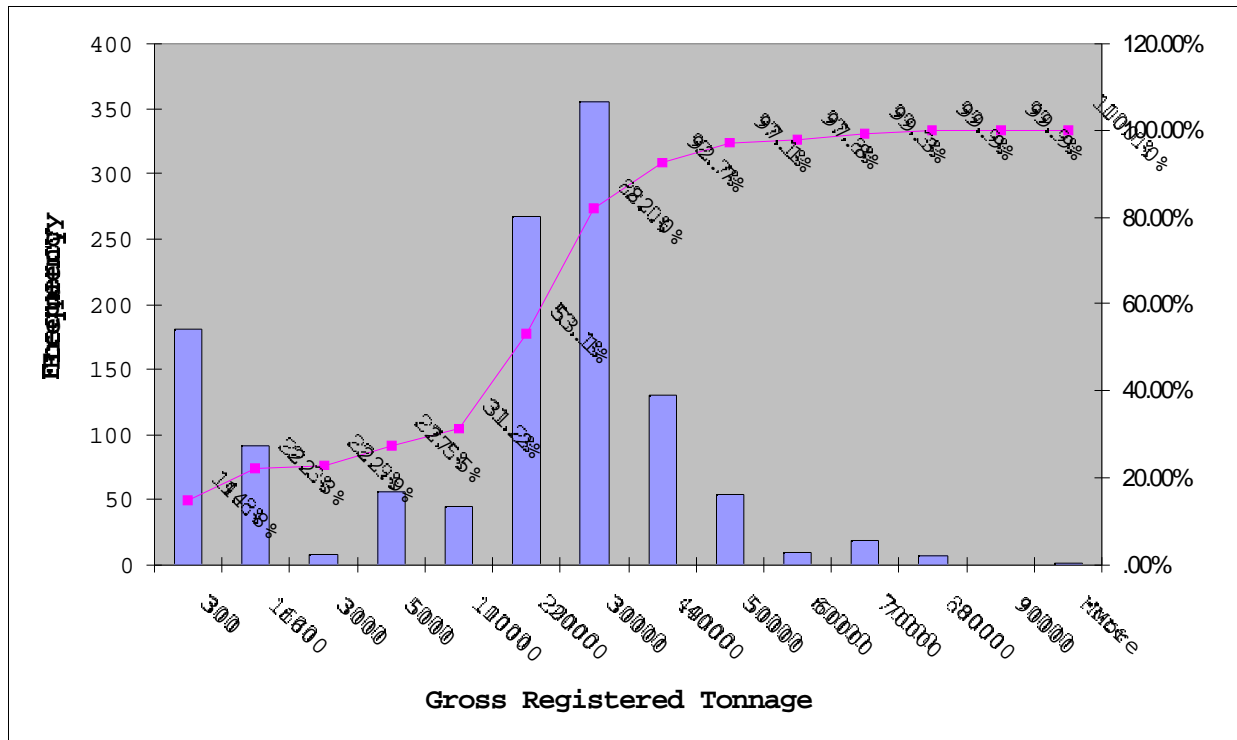


Figure 6: Histogram of Gross Registered Tonnage

Various recommendations have been made regarding which vessels the ATBA should be expanded to include. The lower suggested size for ATBA applicability is 300 GRT. The Monterey Bay National Marine Sanctuary Vessel Traffic Workgroup defined Large Commercial Vessels as being above 300 GRT. Vessels of this size are required by Washington State to have oil spill contingency plans. Other cutoffs selected for evaluation include; 1,600 GRT (cutoff for Pilotage Requirements); 3,000 GRT (category used in the RA); 5,000 GRT (OPA 90 requirement cutoff for double-hulled tank vessels and the upper limit for Research and Fisheries Vessels operating in OCNMS); and 10,000 GRT (used as an approximation for the lower limit of dry cargo vessels).

Table 8 shows the impact of the following scenarios:

Scenario 1: ATBA applies to all vessels 300 GRT and above
Scenario 2: ATBA applies to all vessels 1600 GRT and above
Scenario 3: ATBA applies to all vessels 3000 GRT and above
Scenario 4: ATBA applies to all vessels 5000 GRT and above
Scenario 5: ATBA applies to all vessels 10000 GRT and above

Analysis Class	< 300 GRT	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Missing Values	Total Number
Tug/Barge	103	63	5	5	0	0	257	423
Bulk Carrier	0	355	352	351	351	348	33	388
Container	0	308	308	308	308	279	26	334
General Cargo	2	107	104	103	100	98	19	128
Fishing	16	51	43	39	7	2	56	123
Misc	7	23	13	12	9	7	87	117
Govt/ Warship	N/A	N/A	N/A	N/A	N/A	N/A	96	110
Vehicle Carrier	0	60	59	59	59	55	7	67
Hazmat Barge	N/A	N/A	N/A	N/A	N/A	N/A	29	59
Passenger	17	33	33	31	31	31	9	59
Scientific/ Research	4	9	8	8	0	0	12	25
Tanker	N/A	N/A	N/A	N/A	N/A	N/A	1	21
TOTAL AFFECTED VESSELS/ SCENARIO	149	1009	925	916	865	820	629	1854

Table 8: Number of vessel transits by scenario

In addition, Appendix B provides a cumulative count of vessels (not separated by size class) by gross tonnage. Information was excluded in the table for three classes of vessels for which our recommendation will have no change: Tankers and Hazmat barges (the ATBA currently applies to these vessels); and Govt/Warfare (as a matter of U. S. policy, the ATBA does not apply to these vessels). The first column (< 300 GRT) includes vessels, which would not be affected by any of the scenarios. This size of vessel is underrepresented in the database, as many small vessels do not participate in the MCTS.

In addition to scenarios based on vessel size, consideration was given to the operations of the vessels; e.g., the vessel is conducting allowable operations with the ATBA versus transiting through. The following is a list of activities, in addition to transits, which might occur in the ATBA:

1. Law Enforcement
2. Search and Rescue
3. Oil Spill Response
4. Salvage
5. Research
6. Survey
7. Fishing
8. Recreational use (sightseeing, small fishing, etc)

SCENARIO EVALUATION

The Coast Guard's Regulatory Assessment supports the concern regarding hazards associated with large commercial vessels. Both the Sanctuary Advisory Council and the North Puget Sound Risk Management Panel have recommended the expansion of the ATBA. The NPSRMP's recommendation vessels "with significant quantities of fuel oil on board", but did not specify what constituted significant.

In the process of developing a recommendation, Sanctuary staff evaluated each scenario against a number of decision criteria or objectives. These included the following:

1) Reduce the environmental risk posed by the threat of an oil spill, considering both current and future marine traffic patterns.

Each alternative provides an incremental increase in protection. Scenario 1 is the most restrictive, including a higher proportion of vessels which were not identified as LCV's. Scenario 5 provides a lower level of protection, as fewer vessels are restricted from transiting through the ATBA. Scenario 5 includes most, but not all of those vessels previously identified as representing Large Commercial Vessels (see Figure 4). All scenarios are assumed to provide varying degrees of improvement over the existing ATBA.

2) Ensure that human safety is upheld with any alternative.

Human safety varies by the number and size category of ships encompassed within each of the scenarios. Scenario 1, with a size category of 300 GT or larger, poses the highest risk to human safety by routing numerous smaller vessels further offshore. These vessels are the most vulnerable to navigational difficulties, especially in rough weather.

Vessels greater than 1600 GT are considered large enough to safely maneuver in most weather conditions. Due to the voluntary nature of the ATBA, ships also have the option of entering the ATBA in extreme weather conditions.

3) Potential for IMO approval, based on history of other approved ATBA's.

Sanctuary staff and NOAA General Counsel reviewed IMO approved ATBA language and associated size restrictions. Our experience has been that IMO uses fairly straightforward language easily understood by the mariner community, especially in relation to tonnage classifications. After weighing environmental and human safety factors, we felt that Scenarios 2-3 were the most appropriate. 1600 GT (Scenario 2) is the cutoff for pilotage requirements, whereas 3000 GT (Scenario 3) has no regulatory significance. Therefore, we felt that Scenario 2 has the greatest potential for IMO approval.

4) Ability to implement and monitor enhanced ATBA

All scenarios will require modifications to existing charts and improved education with the mariner community. Monitoring using Tofino radar data is also achievable under each scenario.

RECOMMENDATION

After weighing all these factors, the Sanctuary recommends that the applicability of the ATBA be expanded to include all vessels equal to or greater than 1600 GRT that are transiting through the area. This is not intended to include vessels that are engaged in an otherwise permitted activity that occurs predominantly within the Sanctuary, e.g. fishing. While a list of exemptions was considered, we felt that the term "in transit" effectively dealt with this issue and minimizes confusion. As previously mentioned, it is a standard U.S. Policy to exempt Government or warfare ships so a specific exemption is not required. Given the relatively minor increase in transit time associated with ships entering Gray's Harbor, we are not recommending an exemption for such vessels at this time. Exact language will still need to be developed with the appropriate input from USCG and NOAA staff.

The Sanctuary is not a total exclusion area and safe marine transportation can be compatible with National Marine Sanctuary designation. We believe that this is a balanced proposal that will improve resource protection, while not unduly restricting marine transportation or other permitted activities within the Sanctuary.

APPENDIX A: Means summary table of all variables, by vessel classification

Bulk Carrier						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	375	13	40	290	189	2
DWT	372	16	1748	171931	43003	1193
GRT	355	33	1300	79184	24554	531
BC	196	192	422	46900	3731	423

Container						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	310	24	149	300	211	2
DWT	310	24	12400	69285	28946	639
GRT	308	26	9530	69246	25875	731
BC	156	178	188	8587	6124	135

Fishing						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	88	35	16	204	72	5
DWT	47	76	207	43188	6165	1342
GRT	67	56	100	19385	3253	408
BC	16	107	260	5163	1159	312

General Cargo						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	113	15	50	282	170	3
DWT	111	17	626	165133	27876	1738
GRT	109	19	165	34364	18445	739
BC	78	50	422	3573	1566	74

Govt/Warship						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	67	43	31	340	96	9
DWT	6	104	636	40500	12438	6028
GRT	14	96	1080	96400	10880	6718
BC	0	110

Hazmat Barge						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	18	41	29	172	50	8
DWT	1	58	46100	46100	46100	.
GRT	30	29	197	26113	1067	864
BC	1	58	2099	2099	2099	.

Misc						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	55	62	20	203	65	6
DWT	18	99	132	28464	7798	1955
GRT	30	87	96	17429	4450	1067
BC	6	111	837	1755	1393	144

Passenger						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	56	3	35	264	159	12
DWT	32	27	1456	61421	10947	296
GRT	50	9	89	77441	30893	3780
BC	27	32	185	3592	1963	296

Scientific/Research						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	20	5	40	84	64	4
DWT	8	17	271	1332	418	131
GRT	13	12	85	3180	2012	389
BC	0	25

Tanker						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	21	0	41	288	173	12
DWT	20	1	9013	69131	34916	5135
GRT	20	1	4995	38672	22520	2983
BC	17	4	603	3704	1908	250

Tug/Barge						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	207	216	20	110	37	1
DWT	11	412	135	9995	3783	1486
GRT	166	257	94	4721	446	59
BC	0	423				

Vehicle Carrier						
Variable	Count	Missing Values	Minimum	Maximum	Mean	Std Error
LOA	61	6	82	228	175.58	2
DWT	61	6	2776	68676	16478	1675
GRT	60	7	1382	57018	30670	1610
BC	34	33	422	5279	2391	177

APPENDIX B: Frequency Summary Table of Gross Registered
Tonnage (GRT) of all OCNMS ATBA Vessels

GRT	Frequency	Percent	Cumulative Frequency	Cumulative Percent
85	2	0.2	2	0.2
89	1	0.1	3	0.2
94	6	0.5	9	0.7
96	8	0.7	17	1.4
97	6	0.5	23	1.9
99	2	0.2	25	2.0
100	3	0.2	28	2.3
111	1	0.1	29	2.4
129	1	0.1	30	2.5
139	1	0.1	31	2.5
141	3	0.2	34	2.8
147	1	0.1	35	2.9
148	3	0.2	38	3.1
149	2	0.2	40	3.3
165	1	0.1	41	3.4
169	1	0.1	42	3.4
173	3	0.2	45	3.7
175	1	0.1	46	3.8
177	5	0.4	51	4.2
189	2	0.2	53	4.3
190	1	0.1	54	4.4
191	2	0.2	56	4.6
195	2	0.2	58	4.7
196	2	0.2	60	4.9
197	18	1.5	78	6.4
198	10	0.8	88	7.2
199	13	1.1	101	8.3
209	1	0.1	102	8.3
216	3	0.2	105	8.6
244	2	0.2	107	8.8
252	1	0.1	108	8.8
257	1	0.1	109	8.9
270	1	0.1	110	9.0
284	23	1.9	133	10.9
297	2	0.2	135	11.0
298	43	3.5	178	14.6
302	1	0.1	179	14.6
304	1	0.1	180	14.7
325	1	0.1	181	14.8
350	1	0.1	182	14.9
361	2	0.2	184	15.1
366	1	0.1	185	15.1
376	11	0.9	196	16.0
432	39	3.2	235	19.2
448	1	0.1	236	19.3
481	1	0.1	237	19.4
495	2	0.2	239	19.6
498	3	0.2	242	19.8
552	1	0.1	243	19.9
567	2	0.2	245	20.0

605	1	0.1	246	20.1
648	2	0.2	248	20.3
822	1	0.1	249	20.4
854	1	0.1	250	20.5
1023	1	0.1	251	20.5
1025	2	0.2	253	20.7
1080	6	0.5	259	21.2
1300	3	0.2	262	21.4
1318	1	0.1	263	21.5
1382	5	0.4	268	21.9
1509	1	0.1	269	22.0
1519	1	0.1	270	22.1
2125	1	0.1	271	22.2
2928	2	0.2	273	22.3
2961	1	0.1	274	22.4
2966	4	0.3	278	22.7
3051	9	0.7	287	23.5
3124	3	0.2	290	23.7
3180	1	0.1	291	23.8
3183	1	0.1	292	23.9
3369	1	0.1	293	24.0
3457	1	0.1	294	24.1
3642	2	0.2	296	24.2
3732	6	0.5	302	24.7
3765	3	0.2	305	25.0
3813	2	0.2	307	25.1
4068	1	0.1	308	25.2
4079	1	0.1	309	25.3
4312	13	1.1	322	26.4
4345	3	0.2	325	26.6
4392	1	0.1	326	26.7
4721	5	0.4	331	27.1
4964	1	0.1	332	27.2
4995	2	0.2	334	27.3
5200	2	0.2	336	27.5
5495	1	0.1	337	27.6
5617	1	0.1	338	27.7
6070	1	0.1	339	27.7
7114	1	0.1	340	27.8
7145	1	0.1	341	27.9
7248	1	0.1	342	28.0
7805	1	0.1	343	28.1
8096	1	0.1	344	28.2
8388	2	0.2	346	28.3
8416	3	0.2	349	28.6
9246	2	0.2	351	28.7
9530	28	2.3	379	31.0
10551	1	0.1	380	31.1
10829	1	0.1	381	31.2
11000	2	0.2	383	31.3
11290	1	0.1	384	31.4
11535	2	0.2	386	31.6
11542	1	0.1	387	31.7
11983	1	0.1	388	31.8
11998	9	0.7	397	32.5
12000	3	0.2	400	32.7
12044	1	0.1	401	32.8

12077	1	0.1	402	32.9
13110	1	0.1	403	33.0
13190	2	0.2	405	33.1
13539	2	0.2	407	33.3
13596	3	0.2	410	33.6
13635	4	0.3	414	33.9
13696	5	0.4	419	34.3
13712	4	0.3	423	34.6
13779	1	0.1	424	34.7
13781	1	0.1	425	34.8
13967	2	0.2	427	34.9
14135	1	0.1	428	35.0
14149	1	0.1	429	35.1
14156	1	0.1	430	35.2
14227	2	0.2	432	35.4
14286	2	0.2	434	35.5
14397	3	0.2	437	35.8
14436	1	0.1	438	35.8
14446	2	0.2	440	36.0
14456	1	0.1	441	36.1
14526	1	0.1	442	36.2
14573	1	0.1	443	36.3
14787	2	0.2	445	36.4
15018	1	0.1	446	36.5
15136	37	3.0	483	39.5
15137	1	0.1	484	39.6
15282	1	0.1	485	39.7
15355	1	0.1	486	39.8
15612	1	0.1	487	39.9
15622	1	0.1	488	39.9
15786	1	0.1	489	40.0
15820	1	0.1	490	40.1
15834	1	0.1	491	40.2
15865	1	0.1	492	40.3
15899	1	0.1	493	40.3
15904	2	0.2	495	40.5
15934	1	0.1	496	40.6
15988	3	0.2	499	40.8
16021	1	0.1	500	40.9
16140	2	0.2	502	41.1
16233	4	0.3	506	41.4
16252	1	0.1	507	41.5
16285	3	0.2	510	41.7
16446	2	0.2	512	41.9
16498	1	0.1	513	42.0
16524	1	0.1	514	42.1
16575	12	1.0	526	43.0
16600	11	0.9	537	43.9
16622	2	0.2	539	44.1
16651	3	0.2	542	44.4
16712	1	0.1	543	44.4
16725	4	0.3	547	44.8
16764	2	0.2	549	44.9
16769	1	0.1	550	45.0
16789	1	0.1	551	45.1
16803	3	0.2	554	45.3
16992	9	0.7	563	46.1

17046	1	0.1	564	46.2
17054	1	0.1	565	46.2
17061	4	0.3	569	46.6
17065	1	0.1	570	46.6
17066	4	0.3	574	47.0
17126	1	0.1	575	47.1
17214	2	0.2	577	47.2
17275	1	0.1	578	47.3
17377	2	0.2	580	47.5
17429	1	0.1	581	47.5
17845	1	0.1	582	47.6
17858	2	0.2	584	47.8
17977	4	0.3	588	48.1
17999	1	0.1	589	48.2
18095	2	0.2	591	48.4
18108	3	0.2	594	48.6
18233	5	0.4	599	49.0
18328	1	0.1	600	49.1
18639	1	0.1	601	49.2
18661	1	0.1	602	49.3
18722	1	0.1	603	49.3
18732	1	0.1	604	49.4
19089	2	0.2	606	49.6
19327	2	0.2	608	49.8
19354	2	0.2	610	49.9
19385	5	0.4	615	50.3
19623	30	2.5	645	52.8
19864	2	0.2	647	52.9
20125	1	0.1	648	53.0
20276	1	0.1	649	53.1
20344	8	0.7	657	53.8
20815	7	0.6	664	54.3
21043	1	0.1	665	54.4
21135	1	0.1	666	54.5
21139	9	0.7	675	55.2
21193	1	0.1	676	55.3
21284	1	0.1	677	55.4
21305	2	0.2	679	55.6
21308	1	0.1	680	55.6
21309	1	0.1	681	55.7
21471	1	0.1	682	55.8
21687	2	0.2	684	56.0
21886	1	0.1	685	56.1
21941	1	0.1	686	56.1
22009	1	0.1	687	56.2
22064	1	0.1	688	56.3
22091	1	0.1	689	56.4
22132	1	0.1	690	56.5
22145	2	0.2	692	56.6
22147	2	0.2	694	56.8
22208	1	0.1	695	56.9
22215	1	0.1	696	57.0
22258	1	0.1	697	57.0
22293	5	0.4	702	57.4
22331	1	0.1	703	57.5
22361	1	0.1	704	57.6
22454	3	0.2	707	57.9

22531	2	0.2	709	58.0
22587	1	0.1	710	58.1
22792	1	0.1	711	58.2
23107	1	0.1	712	58.3
23207	1	0.1	713	58.3
23253	1	0.1	714	58.4
23263	1	0.1	715	58.5
23270	1	0.1	716	58.6
23381	1	0.1	717	58.7
23391	1	0.1	718	58.8
23463	3	0.2	721	59.0
23501	1	0.1	722	59.1
23536	1	0.1	723	59.2
23568	5	0.4	728	59.6
23569	5	0.4	733	60.0
23619	4	0.3	737	60.3
23705	2	0.2	739	60.5
23785	96	7.9	835	68.3
23809	8	0.7	843	69.0
23981	4	0.3	847	69.3
24500	15	1.2	862	70.5
24544	20	1.6	882	72.2
24559	2	0.2	884	72.3
24600	1	0.1	885	72.4
24606	3	0.2	888	72.7
24639	1	0.1	889	72.7
24643	1	0.1	890	72.8
24723	2	0.2	892	73.0
24804	7	0.6	899	73.6
24946	1	0.1	900	73.6
24969	2	0.2	902	73.8
25063	1	0.1	903	73.9
25169	1	0.1	904	74.0
25359	2	0.2	906	74.1
25498	1	0.1	907	74.2
25503	2	0.2	909	74.4
25525	1	0.1	910	74.5
25600	2	0.2	912	74.6
25846	3	0.2	915	74.9
25904	1	0.1	916	75.0
25905	1	0.1	917	75.0
25909	2	0.2	919	75.2
25920	1	0.1	920	75.3
25943	2	0.2	922	75.5
25982	1	0.1	923	75.5
26018	1	0.1	924	75.6
26058	2	0.2	926	75.8
26059	1	0.1	927	75.9
26091	1	0.1	928	75.9
26113	1	0.1	929	76.0
26322	1	0.1	930	76.1
26400	2	0.2	932	76.3
26703	1	0.1	933	76.4
26746	1	0.1	934	76.4
26758	1	0.1	935	76.5
27003	1	0.1	936	76.6
27011	2	0.2	938	76.8

27012	3	0.2	941	77.0
27069	1	0.1	942	77.1
27087	1	0.1	943	77.2
27102	4	0.3	947	77.5
27104	4	0.3	951	77.8
27470	1	0.1	952	77.9
27491	1	0.1	953	78.0
27563	1	0.1	954	78.1
27650	1	0.1	955	78.2
27658	1	0.1	956	78.2
27798	1	0.1	957	78.3
27818	4	0.3	961	78.6
27938	1	0.1	962	78.7
28087	6	0.5	968	79.2
28482	1	0.1	969	79.3
28805	19	1.6	988	80.9
29235	1	0.1	989	80.9
29381	7	0.6	996	81.5
29450	1	0.1	997	81.6
29729	3	0.2	1000	81.8
29965	2	0.2	1002	82.0
30767	3	0.2	1005	82.2
30931	2	0.2	1007	82.4
30987	3	0.2	1010	82.7
31367	4	0.3	1014	83.0
31514	1	0.1	1015	83.1
31649	2	0.2	1017	83.2
31661	1	0.1	1018	83.3
33236	7	0.6	1025	83.9
33930	1	0.1	1026	84.0
34285	9	0.7	1035	84.7
34364	2	0.2	1037	84.9
34405	23	1.9	1060	86.7
34467	1	0.1	1061	86.8
34487	10	0.8	1071	87.6
34654	2	0.2	1073	87.8
35065	9	0.7	1082	88.5
35583	1	0.1	1083	88.6
35874	2	0.2	1085	88.8
35879	1	0.1	1086	88.9
35954	2	0.2	1088	89.0
35998	1	0.1	1089	89.1
36008	1	0.1	1090	89.2
36120	1	0.1	1091	89.3
36202	1	0.1	1092	89.4
36303	1	0.1	1093	89.4
36520	2	0.2	1095	89.6
36526	1	0.1	1096	89.7
36549	1	0.1	1097	89.8
36615	1	0.1	1098	89.9
36983	2	0.2	1100	90.0
37193	3	0.2	1103	90.3
37323	1	0.1	1104	90.3
37500	2	0.2	1106	90.5
37695	1	0.1	1107	90.6
37846	1	0.1	1108	90.7
37955	1	0.1	1109	90.8

38240	2	0.2	1111	90.9
38289	1	0.1	1112	91.0
38349	2	0.2	1114	91.2
38433	2	0.2	1116	91.3
38672	4	0.3	1120	91.7
38776	2	0.2	1122	91.8
38852	1	0.1	1123	91.9
38995	3	0.2	1126	92.1
39082	1	0.1	1127	92.2
39422	4	0.3	1131	92.6
39892	1	0.1	1132	92.6
40980	1	0.1	1133	92.7
41010	1	0.1	1134	92.8
41442	3	0.2	1137	93.0
42145	2	0.2	1139	93.2
43209	2	0.2	1141	93.4
43227	1	0.1	1142	93.5
43312	5	0.4	1147	93.9
43805	3	0.2	1150	94.1
44099	13	1.1	1163	95.2
45796	1	0.1	1164	95.3
46087	11	0.9	1175	96.2
46346	1	0.1	1176	96.2
47579	1	0.1	1177	96.3
47751	1	0.1	1178	96.4
48621	7	0.6	1185	97.0
49792	1	0.1	1186	97.1
50087	1	0.1	1187	97.1
50760	2	0.2	1189	97.3
51819	1	0.1	1190	97.4
55423	1	0.1	1191	97.5
56882	3	0.2	1194	97.7
57018	1	0.1	1195	97.8
60117	1	0.1	1196	97.9
64054	4	0.3	1200	98.2
65140	1	0.1	1201	98.3
69153	1	0.1	1202	98.4
69218	10	0.8	1212	99.2
69246	1	0.1	1213	99.3
69845	1	0.1	1214	99.3
73116	2	0.2	1216	99.5
76522	2	0.2	1218	99.7
77441	2	0.2	1220	99.8
79184	1	0.1	1221	99.9
96400	1	0.1	1222	100.0

Frequency Missing = 632